

Professor "Nonlinear"

Obituary and memoir for Roman Juszkiewicz, 1952-2012*

Wojciech A. Hellwing[†]

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Abstract

On 28th and 29th of January 2013 we held an international meeting in Zielona Góra (Poland) honouring the first anniversary of premature passing away of Professor Roman Juszkiewicz. We have celebrated an opening of a new seminar room at the University of Zielona Góra commemorated to the memory of Roman Juszkiewicz and we have shared our anecdotes and memories of this great scientist and friend. Here we want to present a limited and short memoir and obituary for Roman Juszkiewicz.

Professor "Nonlinear" is the honorary nickname which Bernard Jones gave to Roman in his summary of the international cosmology workshop in July 2011 at the Copernicus Center in Warsaw. Roman Juszkiewicz had conquered a special position in our hearts, of which the meeting in Warsaw was a special and telling testimony. Over the year 2010 Roman had run into a serious health problem that prevented him from travelling. As the meeting was specially organized for him, as a welcome back gesture, we decided that if Roman cannot make it to the meeting elsewhere we take the meeting to him. It was not to be, we all know that by July 2011, the sudden deterioration of his health prevented him from participation.

The Professor Nonlinear distinction did not come by coincidence. When we look at the impressive scientific record of Roman Juszkiewicz, we may immediately appreciate that his honorary name is well deserved. Its history starts with the very first paper that Roman submitted to Monthly Notices

*Roman Juszkiewicz passed away on 28th of January 2012

[†]pchela@icm.edu.pl

of the Royal Astronomical Society, in 1981, and that marked the start of his international scientific career. The paper contained a thorough mathematical and physical perturbation analysis in the weakly nonlinear limit for the equations describing the evolution of large scale structures in the Universe. Even today, more than 30 years later, the paper is still cited.

Those who knew Roman at that time recall that he had decided to extract as much information as possible from the fact that the universe is nonlinear, an observation to which he kept on drawing special attention throughout all his career. More than anything he, together with an impressive array of students he guided along these lines, succeeded in this self-imposed task. He contributed many solutions and results to modern cosmology from the perturbation analysis of weakly nonlinear cosmic fields. Of course these were not his only achievements, he touched many areas in cosmology.

To appreciate better the many accomplishments that Roman attained, we should try to know and understand him as a person. Roman never undertook anything half-heartedly. Taking half measures was not acceptable to him, and this striving for perfection was at the core of every aspect of his life. Before anything else his research, as we know that the vast majority of his scientific publications radiate excellence and have become contributions with a high number of citations. But his friends and peers also know Roman as a true "bon vivant", who applied the same standards of perfection to his love of food, wine and every aspect of culture.

Roman was a student of the great and famous Jakov Zel'dovich. Zel'dovich supervised his master thesis at Lomosonov University in Moskow. In 1981 he obtain his PhD degree in physics at the University of Warsaw. Roman's career quickly gained pace, attested by the fact that the ten years following his PhD he spent working in prestigious international institutes. His many collaborators included, amongst others, John Barrow, Joe Silk, Jim Peebles, Marc Davis, Jerry Ostriker, Francois Bouchet, Edmund Bertschinger and Rien van de Weygaert. It would take too much space to list the complete list of his collaborators on this page. In the UK he worked at the IOA in Cambridge and in Sussex, and later he worked in the United States at Berkeley and in Princeton at the Institute for Advanced Studies. Before he returned to Poland, in the second half of the nineties, he was a senior researcher in well-known European institutes, such as the University of Geneva and the Institut d'Astrophysique in Paris. In 1996 he assumed a professor position at the Nicolaus Copernicus Astronomical Center in Warsaw. Five years later, in 2001, he also became professor at the newly founded University of Zielona Gora. In these years he became the mentor and supervisor of many young researchers from Poland and France.

During his successful - be it too short - career he became known for

a range of important and ground-breaking results. Some of these I want to draw attention to. Very important was his work with Ed Bertschinger and Jim Peebles at the end of the eighties that demonstrated beyond doubt that the standard cosmological model in those days - the so-called SCDM or "standard cold dark matter model" - would lead to some serious discrepancies with astronomical observations. Several years later the SCDM model indeed got set aside and in the meantime has been replaced by the LCDM "Lambda Cold Dark Matter" model. Perhaps his greatest acclaim Roman achieved with his work in formulating and developing the theory of nonlinear gravitational instability. One may even say that he set up a school of highly reputable young French cosmologists known for their major contributions in this field, with names such as Francois Bouchet, Francis Bernardeau and Stephane Colombi. The results of this mathematical machinery have been crucial in underpinning our understanding of the onset of nonlinearity in the evolving large scale structure, something which hitherto was only possible within the framework of N-body simulations. Roman also applied perturbation theory to the study of large-scale velocity flows of galaxies, offering a direct means of "weighing" the Universe. Together with Hume Feldman and other collaborators, in 2003 he published a study in which they had managed to estimate the total density of non-relativistic matter in the Universe. The value they found was consistent with estimates that other studies had made. However, the importance of the determination by Feldman, Juskiewicz et al. was that it offered an entirely independent means for estimating this key cosmological parameter. It included and involved physical phenomena that had not before been used and that allowed them to work out the estimates independent of intermediate assumptions or priors. In addition to these contributions professor Juskiewicz was also involved in a large range of other studies and scientific interests. He worked on the cosmic microwave background radiation, on the statistics of high order correlations of cosmic fields, on the topology of the Universe and also on modified gravity models. In all of these subjects, he made major contributions.

Not only was Roman a great scientist. To all of us he is known for his cordial and warm social personality. Like a butterfly, whenever he travelled he made new friends and established strong friendships. He had a gift that allowed him to quickly win over people and make long lasting friendships. I think I do not exaggerate when telling that all of his friends do not only know him as expert in elegant mathematics, but also as a world expert of exquisite food and the best of wines. Amongst his friends, it was often joked that Roman would manage in every new city he visited to discover new charming cafes and fabulous restaurants of which the local astronomer and cosmologist would not yet have been aware. Roman loved to hang out and work in those

places.

By losing Roman we not only miss a great scientist, but also a great friend. A warm and friendly man, who constantly amazed us with his new ideas, and entertain us with his many and diverse stories. Aside from this, we lose a man who worshipped life in every aspect, and who always prepared to share his positive energy, no matter the circumstances. It is this image of Professor Nonlinear that we will keep in our hearts and memories ...

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